

What is claimed is:

1. A bio-ablation composition comprising a coding sequence that encodes and expresses in atrioventricular node cells, a molecule that suppresses cellular excitability and a coding sequence that encodes and expresses a protein that decreases the conductance of an ion channel responsible for cellular excitability.
2. The bio-ablation composition of claim 1, wherein the molecule that suppresses cellular excitability is a regulatory G-protein.
3. The bio-ablation composition of claim 2, wherein the G-protein is kir/GEM.
4. The bio-ablation composition of claim 1, wherein the molecule decreases expression of an ion channel.
5. The bio-ablation composition of claim 4, wherein the ion channel is an L-type  $\text{Ca}^{2+}$  channel.
6. The bio-ablation composition of claim 1, wherein the protein that decreases ion channel conductance is  $\text{G}_i$ .
7. The bio-ablation composition of claim 6, wherein the ion channel is a L-type  $\text{Ca}^{2+}$  channel.
8. A kit comprising: a bio-ablation composition comprising a coding sequence that encodes and expresses in atrioventricular cells a molecule that suppresses cellular excitability and a bio-pacemaker composition comprising a coding sequence that encodes and expresses a molecule that increases the pacemaking rate of myocardial cells.

9. The kit of claim 8, wherein the bio-ablation composition coding sequence encodes and expresses a regulatory protein that decreases the expression of ion channels responsible for cellular excitability.
10. The kit of claim 9, wherein the bio-ablation composition further comprises a coding sequence that encodes and expresses a regulatory protein responsible for decreasing the conductance of ion channels responsible for cellular excitability.
11. The kit of claim 8, wherein the bio-pacemaker composition comprises a coding sequence that encodes and expresses in myocardial cells, one or more molecules that increase  $I_K$ .
12. The kit of claim 8, wherein said  $I_K$  comprises one of and a combination of  $I_{Kr}$  and  $I_{Ks}$ .
13. The kit of claim 11, wherein the bio-pacemaker composition coding sequence encodes Erg1, MiRP, MinK, or KvLQT1.
14. The kit of claim 8, wherein the bio-pacemaker composition coding sequence encodes and expresses in myocardial cells, a T-type  $Ca^{2+}$  channel or subunit thereof.
15. The kit of claim 8, wherein the bio-pacemaker composition coding sequence encodes and expresses in myocardial cells, one or more molecules that electrically uncouple cells of the Purkinje fibers from ventricular cells.
16. The kit of claim 14, wherein the bio-pacemaker composition coding sequence encodes a dominant negative form of a connexin.

17. The kit of claim 8, wherein the bio-pacemaker composition encodes and expresses in myocardial cells a molecule that suppresses  $I_{Na}$ .
18. The kit of claim 16, wherein the bio-pacemaker composition coding sequence encodes and expresses in myocardial cells a dominant negative form of wild type sodium channels.
19. The kit of claim 8, wherein the bio-pacemaker composition coding sequence encodes and expresses in myocardial cells the channel or subunit thereof that produces funny current.
20. The kit of claim 18, wherein the bio-pacemaker composition coding sequence encodes and expresses in myocardial cells, a HCN isoform.
21. The kit of claim 18, wherein the bio-pacemaker composition coding sequence encodes and expresses in myocardial cells a T-type  $Ca^{2+}$  channel.
22. The kit of claim 18, wherein the bio-pacemaker composition coding sequence encodes and expresses in myocardial cells one or more molecules that suppress  $I_{Na}$ .
23. The kit of claim 18, wherein the bio-pacemaker composition coding sequence encodes and expresses in myocardial cells one or molecules that suppress  $I_{K1}$ .
24. The kit of claim 8, wherein the bio-pacemaker composition coding sequence encodes and expresses in myocardial cells the NaCaX to upregulate it by at least 100%.
25. A kit comprising an implantable pacemaker and a bio-ablation composition, wherein the bio-ablation composition comprises a coding

sequence that encodes and expresses in atrioventricular node cells, a protein that decreases expression of at least one molecule responsible for cellular excitability.

26. The kit of claim 25, wherein the coding sequence encodes a regulatory protein that decreases expression of an ion channel responsible for cellular excitability.

27. The kit of claim 25, wherein the coding sequence encodes a regulatory protein that decreases the conductance of an ion channel responsible for cellular responsibility.

28. The kit of claim 25, further including a bio-pacemaker composition comprising a coding sequence, the expression of which in cardiac cells increases the intrinsic pacemaking rate of the cardiac cells.

29. A method for restoring function to or preventing cardiac dysfunction of a heart by genetically transforming the myocardial atrioventricular node cells of the heart to decrease expression of one or more molecules to decrease conduction through the cells.

30. The method of claim 29, wherein the cells are genetically modified by delivering to the cells a coding sequence that decreases expression of ion channels responsible for cellular excitability.

31. The method of claim 29, further comprising delivering to the cells a coding sequence that encodes a protein that decreases the conductance of ion channels responsible for cellular excitability.

32. The method of claim 29, further comprising delivering to cells of cardiac Purkinje fibers, ventricular cells, cells of the His bundle and/or cells of the

upper bundle branches, one or more coding sequences that increase the pacemaker rate of myocardial cells.

33. The method of claim 29, further including implanting an implantable pacemaker in the heart either prior to or simultaneously with delivery of the coding sequence.

34. A system comprising a bio-ablated AV node made by the process of delivering to AV node cells a bio-ablation composition comprising a coding sequence that encodes and expresses in the AV node cells a molecule that decreases expression of a protein responsible for cellular excitability and a pacemaker.

35. The system of claim 34, wherein the pacemaker comprises a bio-pacemaker made by the process of delivering to myocardial cells of the Purkinje fibers, ventricular cells, cells of the His bundle and/or cells of the upper bundle branches, a bio-pacemaker composition, wherein the bio-pacemaker composition comprises a coding sequence, the expression of which increases intrinsic pacemaking rate of the cells.

36. The system of claim 34, wherein the pacemaker is an implantable pacemaker.

37. The system of claim 35, further comprising an implantable pacemaker.

38. The system of claim 37, wherein one of said implantable pacemaker and bio-pacemaker is active and the other is on stand-by or inactive.

39. The system of claim 37, wherein said implantable pacemaker monitors performance of said bio-pacemaker and takes over the pacing function when said bio-pacemaker is not operational.

40. The system of claim 37, wherein said implantable pacemaker continuously monitors the performance of said bio-pacemaker and stores information and data for retrieval.

41. The system of claim 37, wherein said implantable pacemaker comprises an alarm to alert a patient to get a follow-up visit with a physician if the bio-pacemaker is not operating adequately.

42. A method of changing a heart rate comprising:  
suppressing  $I_{K1}$ ; and  
upregulating NaCaX.

43. The method of claim 42 wherein a  $\beta$ -adrenergic stimulation of bio-pacemaker cells is prevalent prior to said suppressing and upregulating.

44. A method of changing a heart rate comprising:  
suppressing  $I_{K1}$ ;  
upregulating NaCaX; and  
upregulating  $I_{to}$ .

45. The method of claim 44 wherein a  $\beta$ -adrenergic stimulation of bio-pacemaker cells is prevalent prior to said suppressing  $I_{K1}$ , upgrading NaCaX and upgrading  $I_{to}$ .